DRISI

CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

Research Notes

Type 85 Concrete Bridge Rail Development and Testing

A replacement for the Type 80 Concrete Bridge Rail is being developed and will be crash tested to the current crash test guidelines.

Geotechnical/ Structures

JUNE 2023

Project Title:
MASH 2016 Compliance of Roadside Safety Features

Task Number: 3031

Start Date: May 10, 2017

Completion Date: Pending

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WHAT IS THE NEED?

The Type 80 bridge rail is an existing design that has been built on numerous bridges throughout California, providing adequate service. It is an aesthetic, see-through barrier rail widely used in California.

New crash testing guidelines, the Manual for Assessing Safety Hardware or MASH, have recently been released. The Implementation Agreement for MASH 2016 will sunset Federal Aid Eligibility for new installations of roadside safety hardware that has not been evaluated to MASH. The sunset date for bridge railings is December 31, 2019. A taller version of the Type 80 (called the Type 85) will be crash-tested according to the newer, stricter crash test guidelines.

WHAT ARE WE DOING?

The existing Type 80 design will be modified to be taller and more likely to meet the MASH 2016 evaluation criteria. A construction contract package is being assembled for the test article construction. Once the test article is complete, compliance crash testing will be conducted. If any of the tests are not successful, redesign and retesting may be necessary.

When testing is complete, the final report will be written. If the testing shows that the product meets MASH 2016 evaluation criteria, then a standard plan will be developed, and the product may be submitted to Federal Highway Administration for a Federal Aid Eligibility Letter.

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WHAT IS OUR GOAL?

Our goal is to produce new construction contract standards for the Type 85 bridge rail compliant with the California Department of Transportation (Caltrans) design standards and the implementation agreement for MASH 2016. To accomplish this, we will have to determine if the Type 85 meets the evaluation criteria of MASH Test Level 4 for longitudinal barriers.

Test Level 4 consists of three crash tests:

1. A 1100-kg car at 100 km/h and a 25˚-impact angle
2. A 2270-kg pickup truck at 100 km/h and a 25˚-impact angle,
3. A 10,000-kg van body truck at 90 km/h and a 15˚-impact angle.

The goal of the project is to verify the crashworthiness of the barrier for use on California highways.

WHAT IS THE BENEFIT?

The benefit of this research is a standard plan for a MASH-compliant version of a barrier that has been widely used by for Caltrans for many years. By meeting the federal safety guidelines, Caltrans will have reduced tort liability and will continue to have federal fund reimbursement eligibility for this type of barrier.

WHAT IS THE PROGRESS TO DATE?

The barrier design and analysis were completed. A construction contract for the test article, the Type 85 bridge rail, was submitted, advertised, and executed. The test article was constructed at the Caltrans Dynamic Test Facility. All three of the test vehicles were purchased with the assistance of the Division of Equipment. All three full scale crash tests described in the Goal section above were conducted and evaluated for compliance with satisfactory results. The Type 85 Bridge Rail is MASH 2016 compliant.

A project final report for this task has been drafted with finalization pending. The testing results were presented to the Caltrans Structures and the Caltrans Highway Safety Features New Products Committee (HSFNPC). The HSFNPC voted to recommend approval of the Type 85 Bridge Rail for use in California. Structures staff have posted Structures XS Sheets for the Type 85 and plans to add them to the Caltrans Standard Plans. A construction project has been awarded that is using a drill and bond version of the Type 85 to replace an existing bridge rail. The research project final report documents some of the design criteria, construction of the barrier, analysis, and the results of the testing.

IMAGES

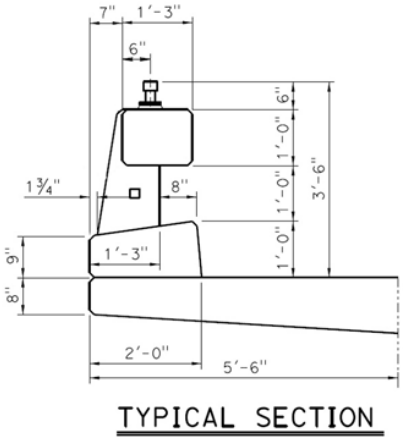

Image 1: Type 85 Bridge Rail Cross Section

Image 2: Completed Type 85 Bridge Rail at the Caltrans Dynamic Test Facility

Image 3: Type 85 Bridge Rail: Small Car Impact

Image 4: Type 85 Bridge Rail: Pickup Truck Impact

Image 5: Type 85 Bridge Rail: Van Body Impact